

New and Rare Species of the Genus *Paraliparis* (Family Liparididae) from Southern Japan

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Abstract Three species of the genus *Paraliparis*, *P. mandibularis* sp. nov., *P. meridionalis* sp. nov., and *P. atramentatus* Gilbert et Burke are described or redescribed. *P. mandibularis* from Tosa Bay is distinguished by its oblique mouth, origin of uppermost pectoral fin ray located below tip of lower jaw, and 27 pectoral fin rays. *P. meridionalis* from the Okinawa Trough, the East China Sea, is distinguished by conical teeth forming wide bands on both jaws, gill opening wholly located above pectoral fin, and 60–62 dorsal, 54–56 anal, 22–23 pectoral and 8 caudal fin rays. *P. atramentatus* from the Okinawa Trough is the second record of the species. A key is provided for all species of the genus *Paraliparis* known from Japan.

The genus *Paraliparis* is primarily distinguished by the absence of the ventral disk and snout barbels, and the presence of six branchiostegal rays. Five species of the genus have previously been recorded from waters around Japan (Gilbert and Burke, 1912; Kido, 1983). During groundfish surveys of fisheries resources conducted by the Fisheries Agency of Japan in recent years, two more species were collected from southern Japan. A species collected from Tosa Bay is described here as a new species, as is another from the Okinawa Trough. In addition, a second record of *P. atramentatus* is reported here.

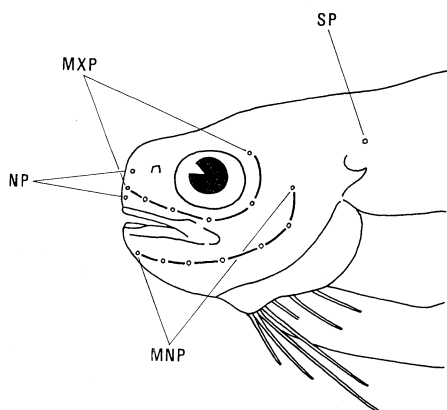


Fig. 1. Diagram showing the arrangement of cephalic pores on a typical liparidid fish. MNP, mandibular pore; MXP, maxillary pore; NP, nasal pore; SP, suprabranchial pore.

Counts, morphometry and terminology follow Stein (1978a) except that lower pectoral fin lobe rays are counted from the anteriormost ray to the longest ray. The cephalic pore formula lists the number of pores in each series in the following order: nasal, maxillary, mandibular and suprabranchial series (Fig. 1). Counts of vertical fin rays and vertebrae are based on radiographs.

Paraliparis mandibularis sp. nov.

(New Japanese name: Ago-inki-uo)

(Figs. 2, 3)

Holotype. BSKU (Department of Biology, Faculty of Science, Kochi University) 30513, male, 107 mm SL, 32°58'N, 133°32'E, Tosa Bay, depth 605 m, 21 Dec. 1979. Collection locality is shown in Fig. 4.

Diagnosis. A *Paraliparis* with oblique mouth; origin of uppermost pectoral fin ray below a horizontal through lower (retroarticular) tip of lower jaw; pectoral fin rays 27.

Description. Morphometry and counts are shown in Table 1.

Body long, greatly compressed, deepest just behind anus, then tapering slowly to caudal fin. Skin thin, fragile, lacking prickles. Rudimentary pores were not observed because of poor skin condition.

Head small, compressed; its upper profile descending slowly to snout. Nostril single with a short tube, located just anteriorly to orbit on a level with upper margin of eye. Eye large. Mouth large, oblique; maxillary extending pos-

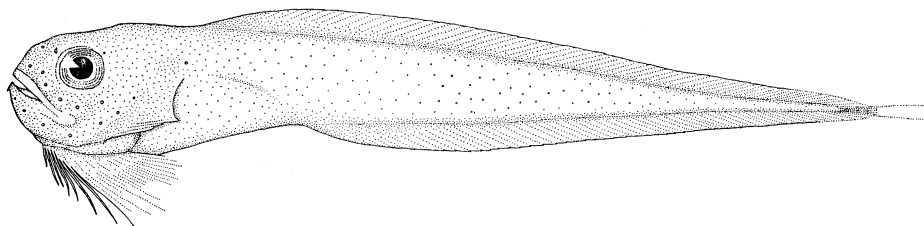


Fig. 2. *Paraliparis mandibularis* sp. nov., holotype, BSKU 30513, 107 mm SL, from Tosa Bay. Posterior part of pectoral fin is damaged.

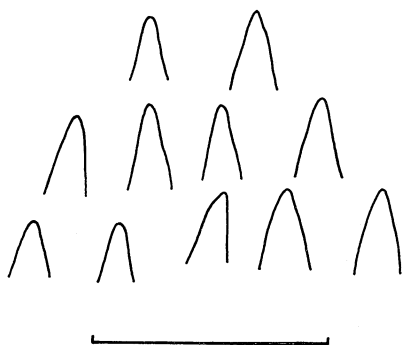


Fig. 3. Premaxillary teeth of *Paraliparis mandibularis* sp. nov., holotype, BSKU 30513. Scale indicates 0.5 mm.

teriorly to below nearly middle of eye. Teeth simple, small and conical (Fig. 3), arranged in irregular oblique rows forming narrow bands less than four teeth wide. Symphysis of mandible fitting in wide and toothless gap at juncture of both premaxillaries; toothless gap at symphysis of mandible narrow. Cephalic pores small. Pores at mandibular symphysis widely separated from each other. Gill opening very large, extending from a horizontal through lower margin of pupil to lower (retroarticular) tip of lower jaw, wholly located above pectoral fin. Opercular flap supported dorsally by two spines extending posteroventrally, ventrally by four branchiostegal rays reaching outline of opercular flap. Upper opercular spine slightly broader than the lower; tips of both spines on a level with posterior corner of maxillary.

Base of pectoral fin extending anteriorly; pectoral symphysis below middle of snout. Uppermost pectoral fin ray below a horizontal through ventral tip of lower jaw. All rays of pectoral fin closely spaced. Anteriormost three rays entirely free from fin membrane. Dorsal

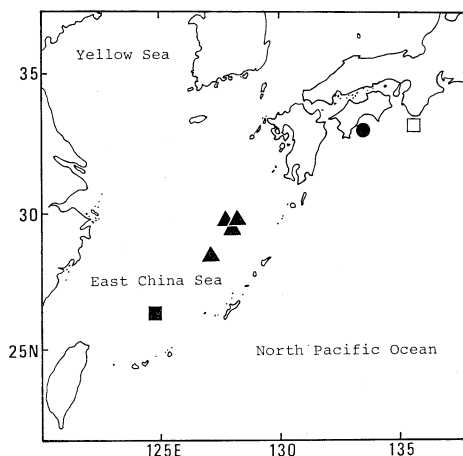


Fig. 4. Map showing collection localities of three *Paraliparis* species. Circle, *P. mandibularis* sp. nov.; triangle, *P. meridionalis* sp. nov.; open square, holotype of *P. atramentatus*; solid square, second specimen of *P. atramentatus*.

fin origin slightly behind a vertical through tip of opercular flap. Anal fin origin below almost 10th dorsal fin ray. Caudal fin narrow.

Anus located below posterior margin of orbit with a short and conical genital papilla.

Stomach relatively large. Pyloric caeca short, bluntly pointed and located on left side of body cavity.

Body color in alcohol pale; posterior part of dorsal and anal fins dusky; body musculature, and oral and branchial cavities sparsely pigmented; peritoneum black; stomach and pyloric caeca pale.

Distribution. Known only from Tosa Bay at depth of 605 m (Fig. 4).

Remarks. *Paraliparis mandibularis* is similar to *P. cephalus* Gilbert, *P. mento* Gilbert and *P. angustifrons* Garman from the North Pacific, *P.*

micrurus (Barnard) from the Indian Ocean, and *P. garmani* Burke from the North Atlantic in having the oblique mouth, but it is distinguishable from them in having 27 pectoral and 60 dorsal fin rays instead of 14–21 or 37 pectoral and ca. 35–37 or 50–59 dorsal fin rays in the other five species (Burke, 1930; Stein, 1978a, b). In addition to the above characters, it differs from *P. cephalus* in having more anal and caudal fin rays and vertebrae (44–51 anal and 4 caudal fin rays and 57–63 vertebrae in *P. cephalus*), uppermost pectoral fin ray located below lower tip of lower jaw (uppermost pectoral fin ray located above posterior corner of maxillary), evenly spaced pectoral fin rays (more widely spaced rays of notch than those of pectoral fin lobes), and pale stomach (black); from *P. mento* in having more anal and caudal fin rays and vertebrae (49–51 anal and 5 caudal fin rays and 61 vertebrae in *P. mento*), and more maxillary

and mandibular pores (5 maxillary and 5 mandibular pores); from *P. micrurus* in having many more anal fin rays (28–31 anal fin rays in *P. micrurus*), more maxillary and mandibular pores (5 maxillary and 6 mandibular pores), evenly spaced pectoral fin rays (more widely spaced rays of notch than those of pectoral fin lobes), pale stomach, and lacking a coronal pore; from *P. garmani* in having more anal fin rays (49 anal fin rays in *P. garmani*), and evenly spaced pectoral fin rays (more widely spaced rays of notch than those of pectoral fin lobes).

Paraliparis meridionalis sp. nov.

(New Japanese name: Ryūkyū-inki-uo)

(Figs. 5, 6)

Holotype. BSKU 28687, female, 149 mm SL, 29°46.0'N, 127°59.0'E, Okinawa Trough, East China Sea, depth 610–713 m, 20 Mar. 1978.

Paratypes. BSKU 27875, male, 127 mm SL,

Table 1. Morphometry and counts of *Paraliparis mandibularis* sp. nov., *P. meridionalis* sp. nov. and *P. atramentatus* Gilbert et Burke.

Character	<i>P. mandibularis</i>		<i>P. meridionalis</i>			<i>P. atramentatus</i>
	Holotype	Holotype	Paratypes		BSKU 28556	BSKU 26438
	BSKU 30513	BSKU 28687	BSKU 27875	BSKU 28505		
Standard length (mm)	107	149	127	146	143	71
Sex	male	female	male	female	female	female
Percent of SL:						
Body depth	16.3	18.8	17.4	15.4	—	—
Head length	20.8	17.6	18.0	17.4	18.8	18.7
Head width	9.0	9.3	9.6	9.9	—	10.3
Percent of HL:						
Snout	29.7	25.6	28.8	29.6	—	28.8
Eye	27.5	27.9	29.7	26.1	30.6	28.0
Upper jaw	47.3	46.2	48.2	47.8	—	43.9
Lower jaw	47.3	44.7	47.6	44.7	—	41.7
Upper pectoral fin lobe	—	70.6	73.4	73.9	68.7	—
Lower pectoral fin lobe	—	58.4	67.7	—	—	56.7
Gill opening	45.9	16.4	21.0	15.8	—	16.7
Snout to anus	64.9	96.9	84.7	—	—	—
Mandible to anus	64.0	90.1	82.1	—	—	—
Counts:						
Dorsal	60	61	61	62	60	53
Anal	53	56	55	55	54	46
Pectoral (left/right)	27/27	23/23	22/22	22/22	23/23	26/25
Caudal	6	8	8	—	8	8
Vertebrae	9+56=65	11+57=68	11+57=68	11+57=68	11+55=66	10+47=57
Pyloric caeca	6	5	7	6	5	7
Cephalic pores	2-6-7-1	2-6-7-1	2-6-7-1	?-?-?-?	?-?-?-?	2-6-?-?

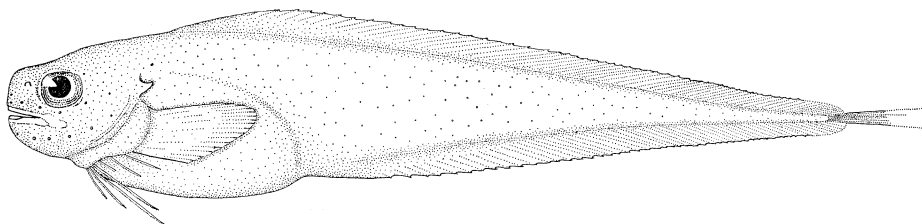


Fig. 5. *Paraliparis meridionalis* sp. nov., holotype, BSKU 28687, 149 mm SL, from Okinawa Trough, East China Sea.

28°35.0'N, 127°10.0'E, Okinawa Trough, depth 600 m, 16 Mar. 1978; BSKU 28505, female, 146 mm SL, 29°44.0'N, 128°03.3'E, Okinawa Trough, depth 815 m, 20 Mar. 1978.

Non-type material. BSKU 28556, female, 143 mm SL, 29°49.0'N, 128°06.0'E, Okinawa Trough, depth 915–932 m, 20 Mar. 1978.

Collection localities are shown in Fig. 4.

Diagnosis. A *Paraliparis* with conical teeth forming wide bands on both jaws; gill opening wholly located above pectoral fin; dorsal fin rays 60–62; anal fin rays 54–56; pectoral fin rays 22–23; caudal fin rays 8.

Description. Morphometry and counts are shown in Table 1. Data in parentheses apply to paratypes and BSKU 28556.

Body long, compressed, deepest at middle between anus and anal fin origin. Almost all skin torn off.

Head small, compressed; its upper profile descending slowly to snout, then abruptly to upper jaw. Nostril single with a short tube, located in front of eye on a level with middle of eye. Eye large. Mouth terminal and horizontal; maxillary extending posteriorly to below posterior margin of pupil. Teeth simple, small, conical (Fig. 6). Tooth bands wide, composed of 16 (16–18 in paratypes and 17 in BSKU 28556) oblique rows on premaxillary and 15 (14–16 in paratypes and 16 in BSKU 28556) rows on dentary. Symphyseal gap very narrow on both jaws. Cephalic pores small. Anterior-most pair of mandibular pores close to each other, but not in the same pit. Gill opening small, wholly located above pectoral fin. Opercular flap triangular, supported by two spines recurved dorsally; upper opercular spine much broader than the lower; those tips nearly on a level with middle of eye.

Pectoral fin notch moderately deep. Pectoral

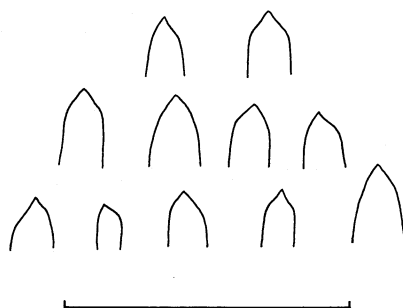


Fig. 6. Premaxillary teeth of *Paraliparis meridionalis* sp. nov., holotype, BSKU 28687. Scale indicates 0.5 mm.

symphysis below posterior margin of pupil. Uppermost pectoral fin ray nearly on a level with lower margin of orbit. Upper pectoral fin lobe short with 16 (14–15 in paratypes and 16 in BSKU 28556) rays, not reaching anal fin origin; notch bridged by 4 widely spaced rays; lower pectoral fin lobe with 3 short rays, somewhat shorter than upper pectoral fin lobe, extending behind a vertical through tip of opercular flap. Dorsal fin origin slightly behind a vertical through tip of opercular flap. Anal fin origin below 11th (10th) dorsal fin ray. Caudal fin narrow.

Anus located below gill opening.

Stomach large. Pyloric caeca short, bluntly pointed and located on left side of body cavity.

Body color when fresh dusky, semitransparent; eye and lower half of head jet black; peritoneum jet black through abdominal wall. Color of head in alcohol dusky; lips dusky; body musculature not pigmented; oral and branchial cavities dusky; peritoneum black; stomach and pyloric caeca pale.

Distribution. Known only from the Okinawa Trough, the East China Sea, at depths of 600 to 932 m (Fig. 4).

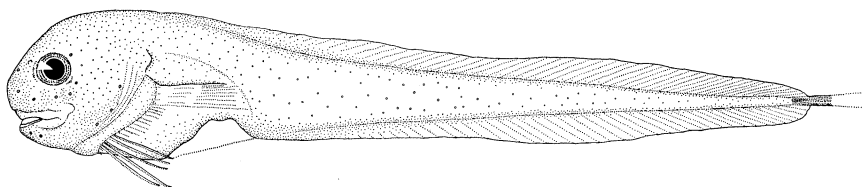


Fig. 7. *Paraliparis atramentatus*, BSKU 26438, 71 mm SL, from Okinawa Trough, East China Sea. Posterior part of pectoral fin is damaged.

Remarks. Although this species is very similar to *Paraliparis rosaceus* Gilbert in most characters, its pattern of dentition differs distinctly from that of the latter. Teeth of *P. rosaceus* larger than 100 mm SL are arranged in a single series and in narrow bands only at symphysis on both jaws (Stein, 1978a). However, teeth of *P. meridionalis* in 127–149 mm SL form wide bands on both jaws. Furthermore, this species occurs in shallower depths than *P. rosaceus*, which has been recorded at depths of 1,050 to 3,358 m (Gilbert, 1890; Stein, 1978a; Peden and Ostermann, 1980; Kido, 1983).

***Paraliparis atramentatus* Gilbert et Burke**
(Japanese name: Inki-uo)
(Figs. 7, 8)

Paraliparis atramentatus Gilbert and Burke, 1912: 377, pl. 48 (original description; type locality: off Cape Shionomisaki, east coast of Honshu); Burke, 1930: 180, figs. 97–98.

Material. BSKU 26438, female, 71 mm SL, 26°20.1'N, 124°50.7'E, Okinawa Trough, East China Sea, depth 1,000–1,140 m, 22 Jan. 1978. Collection locality is shown in Fig. 4.

Diagnosis. A *Paraliparis* with stout teeth with rounded tips on both jaws; dorsal fin rays 52–53; anal fin rays 46; pectoral fin rays ca. 22–26; vertebrae 57–58.

Description. Morphometry and counts are shown in Table 1.

Body long, greatly compressed, tapering slowly to caudal fin. Skin thin, fragile, lacking prickles. Rudimentary pores were not observed because of poor skin condition.

Head compressed; its upper profile descending steeply to snout. Snout short and deep, slightly projecting. Nostril single with short tube, located in front of eye on a level with upper margin of pupil. Mouth slightly inferior, horizontal; maxillary extending posteriorly to below posterior margin of orbit.

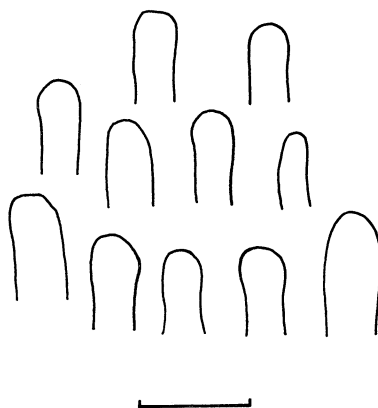


Fig. 8. Premaxillary teeth of *Paraliparis atramentatus*, BSKU 26438. Scale indicates 0.5 mm.

Teeth large, stout, rounded at tips (Fig. 8), forming moderately wide bands composed of 7 oblique rows on premaxillary and 8 rows on dentary. Cephalic pores small. Anteriormost pair of mandibular pores widely separated from each other. Gill opening small, wholly located above pectoral fin. Opercular flap round, supported by two spines extending posteroventrally; upper opercular spine nearly as broad as the lower; tips of both spines on a level with upper margin of pupil.

Pectoral symphysis below posterior margin of eye. Uppermost pectoral fin ray nearly on a level with lower margin of orbit. Upper pectoral fin lobe almost reaching a vertical through anal fin origin; rays of notch not distinguishable from those of upper and lower pectoral fin lobes; lower pectoral fin lobe with 4 rays shorter than the upper fin lobe, reaching behind a vertical through tip of opercular flap. Dorsal fin origin slightly behind a vertical through tip of opercular flap. Anal fin origin below 9th dorsal fin ray. Caudal fin narrow.

Stomach and pyloric caeca located on left

side of body cavity. Stomach small. Pyloric caeca short, bluntly pointed.

Body color in alcohol pale; snout and lips dusky; body musculature sparsely pigmented; oral cavity dusky; branchial cavity black; peritoneum black; stomach and pyloric caeca pale.

Distribution. Known off Cape Shionomisaki on the Pacific coast of Honshu and the Okinawa Trough in the East China Sea at depths of 1,000 and 1,188 m (Fig. 4).

Remarks. Burke (1930: 37) reported that stomach of the holotype of *P. atramentatus* is black. However, its stomach is creamy white (Jeffrey T. Williams, pers. comm.), and the new specimen agrees with the holotype in this character.

The most prominent difference between this specimen and the holotype is pectoral ray count. Gilbert and Burke (1912) described that the holotype has 20 pectoral fin rays. However, they may have been in error, because the holotype may have about 22 pectoral fin rays (Jeffrey T. Williams, pers. comm.). The exact count is uncertain because pectoral fin rays of the holotype are badly damaged. I believe that pectoral fin rays in *P. atramentatus* vary from about 22 to 26, because other characters of the new specimen agree well with the original description.

P. atramentatus was previously known only from the holotype (USNM 73345) off Cape Shionomisaki (Fig. 4). The new specimen represents the second record of this species.

Key to the species of the genus

Paraliparis from Japan

- 1a. Mouth oblique. Origin of uppermost pectoral fin ray located below lower tip of lower jaw. *P. mandibularis* sp. nov. (Tosa Bay, Japan)
- 1b. Mouth horizontal. Origin of uppermost pectoral fin ray located above or on a level with posterior corner of maxillary. 2
- 2a. Teeth on jaws uniserial, in bands only at symphysis. *P. rosaceus* Gilbert (southern Okhotsk Sea; Pacific off Canada and United States)
- 2b. Teeth on jaws in bands only. 3
- 3a. Teeth large, blunt, rounded at ends. Dorsal rays more than 70 or fewer than 54, anal rays more than 63 or fewer than

47, vertebrae more than 74 or fewer than 59. 4

- 3b. Teeth small, conical or canine. Dorsal rays 58–64, anal rays 54–58, vertebrae 64–69. 5

- 4a. Dorsal rays 52–53, anal rays 46, pectoral rays ca. 22–26, vertebrae 57–58.

. *P. atramentatus* Gilbert et Burke (Pacific off Cape Shionomisaki; Okinawa Trough, East China Sea)

- 4b. Dorsal rays 71–82, anal rays 64–76, pectoral rays 31–39, vertebrae 75–86.

. *P. grandis* Schmidt (Okhotsk Sea; eastern coast of Kamchatka)

- 5a. Stomach pale. Caudal rays 8.

. *P. meridionalis* sp. nov. (Okinawa Trough, East China Sea)

- 5b. Stomach black. Caudal rays fewer than 7. 6

- 6a. Dorsal rays 63–64, anal rays 56–58, pectoral rays 20–21, caudal rays 6, vertebrae 69. *P. entochloris* Gilbert et Burke (southern Okhotsk Sea)

- 6b. Dorsal rays 58, anal rays 54, pectoral rays 17, caudal rays 4, vertebrae 64.

. *P. melanobranchus* Gilbert et Burke (southern Okhotsk Sea)

Comparative material

Paraliparis entochloris Gilbert et Burke: holotype, USNM (United States National Museum of Natural History, Washington) 73347, Okhotsk Sea, 46°41' 30"N, 143°57'40"E, Albatross station 5018, depth 100 fms (183 m), 26 Sep. 1906; paratype, SU (Stanford University Collection at California Academy of Sciences, San Francisco) 22381, same locality with holotype.

Paraliparis melanobranchus Gilbert et Burke: holotype, USNM 73346, Okhotsk Sea, 48°22'30"N, 145°43'30"E, Albatross station 5029, depth 440 fms (805 m), 28 Sep. 1906, radiograph only.

Paraliparis atramentatus Gilbert et Burke: holotype, USNM 73345, off Cape Shionomisaki, east coast of Honshu, 33°23'30"N, 135°34'E, Albatross station 4971, depth 649 fms (1,188 m), 30 Aug. 1906, radiograph only.

Paraliparis rosaceus Gilbert: HUMZ (Laboratory of Marine Zoology, Faculty of Fisheries, Hokkaido University) 77743, 77802, 77816, 3 specimens, Okhotsk Sea, 44°25'N–44°56'N, 144°24'E–145°04'E, depth 1,050–1,350 m, 8 Sep. 1978–11 Oct. 1978.

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土佐湾および沖縄舟状海盆から得られたインキウオ属の2新種と1稀種

木戸 芳

土佐湾および沖縄舟状海盆の底魚資源調査によって得られた標本をもとに、クサウオ科、インキウオ属 *Paraliparis* の2新種と1稀種を記載した。

土佐湾から採集された新種のアゴインキウオ *P. mandibularis* は、口が斜位であること、胸鰭最上鰭条の基部が下顎の下端より下にあること、および胸鰭条数が27本であることにより、他種と区別される。

沖縄舟状海盆から採集された新種のリュウキュウインキウオ *P. meridionalis* は、両顎歯が円錐歯で幅広い歯帯を形成すること、鰓孔の全体が胸鰭の基底より上方にあること、および背鰭条数60~62本、臀鰭条数54~56本、胸鰭条数22~23本、尾鰭条数8本であることにより、他種と区別される。

また、沖縄舟状海盆より採集されたインキウオ *P. atramentatus* を第二番目の記録として記載した。

さらに、これらの種を含めた日本産インキウオ属魚類の検索表を示した。

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